

## 6.4 Acids

Typical acids have the following chemical properties:

- they contain hydrogen
- they are non-electrolytes when pure but dissolve in water to become electrolytes
- they change the colours of indicators
- they react with bases and alkalis to form salts and water
- they react with the more reactive metals to form salts and hydrogen
- they react with carbonates to form salts, carbon dioxide and water.

### Aim

To investigate the properties of acids.

### Apparatus and materials

Four test-tubes  
Test-tube rack  
Spatula  
Universal Indicator solution  
pH chart  
Distilled water  
Marble chips  
Magnesium ribbon  
Copper(II) oxide  
Ethanoic acid,  $2 \text{ mol dm}^{-3}$   
Hydrochloric acid,  $2 \text{ mol dm}^{-3}$   
Sulphuric acid,  $2 \text{ mol dm}^{-3}$   
Citric acid

### Procedure

- 1 Place four test-tubes in a test-tube rack. Half fill each test-tube with ethanoic acid.
- 2 Add a 2 cm length of magnesium ribbon to one of the test-tubes. Record your observations.
- 3 Add a spatula measure of marble chips to another test-tube. Record your observations.
- 4 Add a few drops of Universal Indicator solution to another test-tube of acid. Compare the colour produced with that on the pH chart. Record the colour and the pH.
- 5 Add a spatula measure of copper(II) oxide to another test-tube of acid. Gently warm the mixture to dissolve the copper(II) oxide. Leave the contents of the test-tube to settle. Describe the appearance of the solution.

- 6 Repeat steps 1–5 with the other three acids. A solution of citric acid can be prepared by dissolving one spatula measure of the acid in half a test-tube full of distilled water.

### Results

Copy and complete the following table by recording colour and pH:

	ethanoic acid	hydro-chloric acid	sul-phuric acid	citric acid
magnesium ribbon				
marble				
copper(II) oxide				
Universal Indicator				

The strong acids are ..... and .....  
They produce a pH of .....

The weak acids are ..... and .....  
They produce a pH of .....

### Questions

- 1 a) How do you know when the reaction of marble with an acid is complete?  
b) Name the gas given off when magnesium reacts with an acid.  
c) Describe the reaction of acids with copper(II) oxide.  
d) Name the gas produced when a carbonate reacts with an acid.  
e) Suggest another substance that could be used in place of copper(II) oxide.
- 2 Name five acids that do not contain oxygen.
- 3 Look up the following acids in a dictionary and find out how their names originated:  
hippuric acid  
capric acid  
gallic acid  
uric acid  
muriatic acid.
- 4 Write equations for the reactions of dilute hydrochloric acid and ethanoic acid,  $\text{CH}_3\text{COOH}$ , with magnesium and calcium carbonate. Ethanoic acid is monobasic. This means that one mole of ethanoic acid reacts with one mole of sodium hydroxide.